

# Dataset and Research Question

The `sleuth3` package contains a dataset `ex2120`. From the help file:

*These data were simulated to match the summary statistics and conclusions of Rosenthal and Fode's Clever Hans experiment. Each of 12 students trained rats to run a maze. The data set contains their number of successful runs out of 50 on each of 5 days, the student's prior expectation of success (on a scale from -10 to 10), and a variable indicating treatment—whether or not the students were supplied with the fictitious information that their rights were bright.*

You might like to read this article that gives a nice summary of the history of this area of research <https://fs.blog/2018/05/pygmalion-effect/>.

## Analysis Tasks

Your overall task is to fit a logistic regression model to this data in order to assess if there is evidence for a “Clever Hans” effect here. In particular you should complete the following suggested analyses:

1. Using techniques from Week 10 calculate the relevant odds ratio and create a confidence interval for it. The following command may be useful. `tapply(ex2120$Success, ex2120$Treatment, sum)` It sums up the number of successful maze runs by both the “bright” and “dull” rats.
2. Construct a logistic regression model (don't consider `Student` as a variable). The command `binResponse <- cbind(ex2120$Success, 50 - ex2120$Success)` could be useful:
  - Which predictors are significant?
  - Is there evidence for any interaction effects?
  - Does the best model pass a goodness-of-fit test?
3. Use the model to give 95% CIs for the multiplicative effect on the odds of success of:
  - a rat being classified as bright,
  - having another day's practice
  - having a trainer with a one unit increase in their prior expectations.

Interpret what these results mean for the overall questions of interest.

4. Use your model to make predictions for each combination of `PriorExp`, `Treatment` and `Day`. Visualise the predictions of the model. The following code (modified from Week 5) may be useful.

```
priorexp <- seq(-7,10,1)
day <- seq(1,5,1)
treat <- c("bright", "dull")
grid <- expand.grid(PriorExp=priorexp, Treatment=treat, Day=day)
```